

Site:	Syntex Verona
ID #	WBD007452154
Area:	3.1
Other:	OU #1
	7-27-92

July 27, 1992

Daryl W. Roberts
Chief, Bureau of Environmental Epidemiology
Missouri Department of Health
P.O. Box 570
Jefferson City, Missouri 65102

Dear Mr. Roberts:

The purpose of this letter is to respond to your March 19, 1992 proposal for additional sampling and analyses of fish taken from the Spring River downstream from the Syntex Agribusiness, Inc. ("Agribusiness") plant in Verona, Missouri. Specifically, your letter suggested that sampling be performed by personnel from the Missouri Department of Conservation; that Agribusiness pay for the analysis; and that "if levels of dioxin in fish are as low as the past few years, we would have no further concerns about Spring River Fish populations or anglers". While your letter suggested that the sampling and analyses take place in 1993, we understand that the United States Environmental Protection Agency ("EPA") has requested that this effort be completed in 1992. We have some concerns with the proposal, but we are willing to undertake the additional year of sampling you request, as discussed below.

We are concerned because we question the need for an additional year of sampling and analysis. Very low levels of dioxin, or no dioxin, have been consistently detected in fish and sediment downstream from the Verona plant during sampling and analysis performed over the past seven years. As you know, Agribusiness has conducted dioxin sampling and analysis in the Spring River from 1984 to 1990 in accordance with a September 9, 1983 Consent Agreement and Order between Agribusiness and EPA. Under the Order, sampling and analysis of sediment and fish from the Spring River was to extend for an initial five year period, with discretionary and non-discretionary options for extending or shortening the five year program under certain specified conditions. The initial five years of the project took place from 1984 through 1988 and involved fish and sediment sampling from five locations on the Spring River. While Agribusiness believed that the project could be terminated after the initial five years under the provisions of the Order, it agreed, at EPA's request, to sample and analyze fish from four of the five original locations on the Spring River in 1989, and subsequently, to sample and analyze fish from two of the five locations in 1990.

As Agribusiness had done at the conclusion of the prior annual sampling and analytical cycles, it submitted a statistical analysis and report to EPA on March 5, 1991 concerning the 1990 sampling and analytical results. The

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statistical conclusions in the report of the seventh year of sampling and analysis are set out below:

- 1) The dioxin concentrations in fish from Site 1 reflect a decreasing trend over the seven year sampling period. Linear regression analysis of Site 1 data demonstrated evidence (greater than 90% confidence) of a decrease in dioxin levels in fish collected from Site 1 during the seven year sampling interval, and with greater than 99% confidence, a statistically significant decrease in dioxin levels in fish collected from Site 1 during the most recent four year sampling interval. Similarly, a Jonckheere trend analysis demonstrated with greater than 95% confidence a statistically significant decrease in dioxin levels in fish from site 1 over the last four sampling years.
- 2) Linear regression analysis of Site 2 fish dioxin levels demonstrated with greater than 95% confidence a statistically significant decrease over the final four sampling years. This was supported by the Jonckheere test which showed evidence (90% confidence) of a decreasing trend in dioxin levels over the same sampling interval. Site 2 fish dioxin levels in 1990 are markedly lower than any previous Site 2 data.
- 3) Analysis of Sites 1 and 2 combined demonstrated evidence (greater than 90% confidence) of a decrease in dioxin concentration over the course of the seven year study. A statistically significant decrease (greater than 99% confidence) was observed for dioxin in fish taken from both sampling sites over the final four years.

Tables showing the dioxin levels and statistical results are enclosed. The two tables showing dioxin concentrations in fish and sediment from the five sampling locations for the years 1984 through 1988 were submitted to EPA as part of the five year report on January 30, 1989. The table showing dioxin concentrations in fish from Sites 1 and 2 of the years 1984 through 1990 was submitted to EPA as part of the seventh annual report on March 5, 1991.

Based upon prior telephone conversations with representatives from the State and EPA, and based upon the results of the seven year sampling and analytical effort, Agribusiness understands that it has fulfilled its obligations under the 1983 Order concerning sampling and analyzing fish and sediment from the Spring River. However, Agribusiness also understands that the State would like one additional year of fish sampling and analysis, in excess of that required by the 1983 Order, as an alternative to a fish consumption study or to an exposure assessment. For the reasons stated above, Agribusiness does not believe that this new study is needed. However, Agribusiness will undertake one additional year of sampling and analysis. While this study is not required by, and is separate from, the requirements of the 1983 Order, our proposed study protocol corresponds to the protocol that was used for the fish sampling and analytical project in 1990 under the 1983 Order, as presented below.

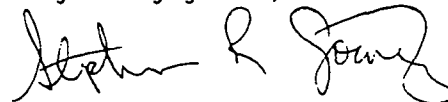
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Fish will be obtained by the Missouri Department of Conservation (MDC) between August 1 and August 31, 1992, and will consist of twenty bottom feeding fish collected from each of two historic locations, 0.3 miles downstream from the Agribusiness Verona, Missouri, plant (Location 1) and 3.0 miles downstream from the Verona Plant (Location 2). MDC will collect the fish by electroshock and classify and label the fish from each location. The size and weight of this collected fish will be consistent with previous samples. The weight and length of each fish will be recorded by MDC in the sampling log using the established format. The twenty fish will be separated into two similar groups, appropriately packed and promptly filleted without skin at the MDC Fish and Wildlife Center using a standard fillet procedure. The fillets from each of the two groups for each location will then be weighed, homogenized, frozen and stored by MDC prior to their shipment to an appropriate analytical laboratory designated by Agribusiness.

The completed Sampling Log will be promptly supplied by MDC to Agribusiness. Upon receiving notification from MDC that the samples are ready, Agribusiness will confirm the identity of the designated laboratory and MDC will be responsible for delivery of the samples to such laboratory for analysis. It is currently anticipated that these samples will be analyzed at Triangle Labs (Research Triangle Park, North Carolina) at Agribusiness' expense. The analytical method to be used is EPA Method 8290. Splits of all samples will be prepared and maintained by the laboratory and will be provided by Agribusiness to MDC upon request. The analytical results will be sent to Agribusiness, with a summary report to MDC and EPA to follow.

We would like to initiate this project in August, 1992 by using Missouri Department of Conservation personnel, as offered in your letter, to collect the requisite number of fish from the Spring River. Please contact me at your earliest convenience so that we may begin preparations to undertake this sampling. Please also contact me if you have any comments or questions concerning this letter.

Very truly yours,



Stephen Gomez, Ph.D

CMH:4011P
enclosures
xc: Bob Field
Linda James

SPRING RIVER, MISSOURI

TABLE 1
DIOXIN CONCENTRATION (ppt_r) IN FISH

LOCATION (MILES DOWNSTREAM FROM THE FACILITY)	DIOXIN CONCENTRATION (ppt _r)							ONE-TAILED P-VALUE*	
	SAMPLING YEAR							JONCKHEERE	
	1984	1985	1986	1987	1988	1989	1990	TEST	T-TEST
1 (0.3)	4, 4	4.5, 3.0	2.8, 2.5	6.5, 4.8	3.0, 3.2	4.7, 3.3	1.6/1.8, 2.1	0.15 (0.02)	0.07 (0.007)
2 (3.0)	3, 4	3.0, 3.0	2.3, 4.4	4.0, 3.4	4.2, 5.9	3.5, 4.1	1.9, 2.0	0.43 (0.10)	0.26 (0.03)

MULTIPLE LINEAR REGRESSION ANALYSIS OF LOCATIONS 1-2:

* ONE-TAILED P-VALUE FROM T-TEST OF NEGATIVE COEFFICIENT
OF SAMPLING YEAR $P = 0.06$ (<0.01)

* 90% CONFIDENCE INTERVAL FOR THE SLOPE OF SAMPLING YEAR
 $CI = (-0.102, 0.004)$ ($CI = (-0.373, -0.147)$)

COMBINATION OF
PROBABILITIES FROM
JONCKHEERE TESTS OF
SIGNIFICANCE AT
LOCATIONS 1-2:
 $P\text{-VALUE} = 0.24$
(0.01)

NOTE: 1. AT THE SAME SITE AND YEAR, DATA FROM THE SAME SAMPLE ARE SEPARATED BY "/"; DATA FROM INDEPENDENT SAMPLES ARE SEPARATED BY ", ".
2. FOR LINEAR REGRESSION ANALYSIS, NATURAL LOG TRANSFORMATION WAS APPLIED TO DIOXIN CONCENTRATION.
3. P-VALUE/CONFIDENCE INTERVAL IN PARENTHESES IS FROM THE CORRESPONDING ANALYSIS OF 4 YEARS OF DATA (1987-1990).

*ONE-TAILED P-VALUE FROM: 1. JONCKHEERE TEST OF DECREASING RANK ORDER OF DIOXIN CONCENTRATION, 2. T-TEST OF NEGATIVE COEFFICIENT FOR SAMPLING YEAR FROM LINEAR REGRESSION ANALYSIS.

SOURCE: IRDM RMBS EPAPLOT (11/5/90 10:56) MBS\$1075 #JONCKEPA (11/9/90) SSC\$4945 #PROB (11/9/90)
RMBS EPAPLOT2 (11/9/90 9:34)

ug/dioconsampyr.ssc

TABLE 1
DIOXIN CONCENTRATION (pptr) IN FISH

LOCATION (MILES DOWNSTREAM FROM THE FACILITY)	DIOXIN CONCENTRATION (pptr)					ONE-TAILED P-VALUE*	
	SAMPLING YEAR					JONCKHEERE TEST	T-TEST
	1984	1985	1986	1987	1988		
1 (0.3)	4, 4	4.5, 3.0	2.8, 2.5	6.5, 4.8	3.0, 3.2	0.46	0.45
2 (3.0)	3, 4	3.0, 3.0	2.3, 4.4	4.0, 3.4	4.2, 5.9	0.06	
3 (6.0)	3, 3	1.5, ND (0.75)	1.2, 1.3	2.3, 1.8	1.5, 1.3	0.77	
4 (9.0)	2, 2	1.3, 1/1	1.1, 1.7	1.6, 1.3	1.1, 1.2	0.93	
5 (12.0)	ND (1), ND (0.75)	ND (0.3), ND (0.25)	ND (0.35), 1.2	0.3, 0.3	0.2, 0.4	0.87	
90% CONFIDENCE INTERVAL FOR THE SLOPE OF SAMPLING YEAR FROM MULTIPLE LINEAR REGRESSION ANALYSIS OF LOCATIONS 2-5: (-0.160, 0.012)						COMBINATION OF PROBABILITIES FROM JONCKHEERE TESTS OF SIGNIFICANCE AT LOCATIONS 2-5: P-VALUE = 0.58	

NOTE: 1. AT THE SAME SITE AND YEAR, DATA FROM THE SAME SAMPLE ARE SEPERATED BY "/"; DATA FROM INDEPENDENT SAMPLES ARE SEPERATED BY " , ".

2. FOR LINEAR REGRESSION ANALYSIS, NATURAL LOG TRANSFORMATION WAS APPLIED TO DIOXIN CONCENTRATION.

ND = CONCENTRATION BELOW DETECTION LIMIT; HALF OF THE DETECTION LIMIT IS LISTED IN PARENTHESES AND USED FOR ANALYSES.

*ONE-TAILED P-VALUE FROM: 1. JONCKHEERE TEST OF DECREASING RANK ORDER OF DIOXIN CONCENTRATION OVER 5 YEARS AT LOCATION 1; AND INCREASING RANK ORDER OF DIOXIN CONCENTRATION OVER 5 YEARS AT LOCATIONS 2-5. 2. T-TEST OF NEGATIVE COEFFICIENT FOR SAMPLING YEAR FROM LINEAR REGRESSION ANALYSIS.

SOURCE: FROM MKL\$4552, MKL\$4559, SSC\$3388 (11/30/88) T-4

TABLE 2
DIOXIN CONCENTRATION (pptr) IN SEDIMENT

LOCATION (MILES DOWNSTREAM FROM THE FACILITY)	DIOXIN CONCENTRATION (pptr)					ONE-TAILED P-VALUE*	
	SAMPLING YEAR					JONCKHEERE TEST	T-TEST
	1984	1985	1986	1987	1988		
1 (0.3)	1.8/1.4	ND (1.55)/ ND (1.45)	ND (3.75)	6.5/6.3	ND (1.95)/ 7.1	0.07	0.052
3 (6.0)	ND (0.75)	ND (1.15)	ND (1.3)	ND (0.4)	ND (1.85)	0.16	
5 (12.0)	ND (0.6)	ND (1.25)	ND (4.55)	ND (0.4)	ND (1.4)	0.31	
90% CONFIDENCE INTERVAL FOR THE SLOPE OF SAMPLING YEAR FROM MULTIPLE LINEAR REGRESSION ANALYSIS OF LOCATIONS 3 AND 5: (-0.286, 0.416)						COMBINATION OF JONCKHEERE TESTS OF SIGNIFICANCE AT LOCATIONS 3 and 5: P-VALUE = 0.20	

NOTE: 1. AT THE SAME SITE AND YEAR, DATA FROM THE SAME SAMPLE ARE SEPERATED BY "/"; DATA FROM INDEPENDENT SAMPLES ARE SEPERATED BY ",".

2. FOR LINEAR REGRESSION ANALYSIS, NATURAL LOG TRANSFORMATION WAS APPLIED TO DIOXIN CONCENTRATION.

ND = CONCENTRATION BELOW DETECTION LIMIT; HALF OF THE DETECTION LIMIT IS LISTED IN PARENTHESES AND USED FOR ANALYSES.

*ONE-TAILED P-VALUE FROM: 1. JONCKHEERE TEST OF INCREASING RANK ORDER OF DIOXIN CONCENTRATION OVER 5 YEARS; 2. T-TEST OF POSITIVE COEFFICIENT FOR SAMPLING YEAR FROM LINEAR REGRESSION ANALYSIS.

SOURCE: IRDM SSC\$3386, SSC\$3392 (12/15/88), SSC\$3401 (12/16/88) T-5